

Green Liquid Monopropellant Thruster for In-space Propulsion

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Identification and Significance of Innovation

A new type of in-space chemical propulsion system for future NASA science spacecraft and long duration missions that

1. Employs a low toxicity liquid monopropellant with high density, high density-specific impulse product, and wide operating temperature range
2. Incorporates a unique higher reliability ignition system with longer operational life than current state-of-the-art, and
3. Is more compact and lighter weight than bipropellant systems

Estimated TRL (1 – 9) at beginning and end of contract:

Start TRL 3, End TRL 4

Technical Objectives and Work Plan

SBIR Program Objective:

Demonstrate and deliver a proof-of concept engineering prototype liquid monopropellant thruster at end of Phase II

Phase I Objectives were:

1. Establish pressure and mass flow ranges for injector configurations that provide reliable ignition and stable combustion
2. Develop space thruster designs incorporating the proposed monopropellant and the new ignition system

Phase I Work Plan and Accomplishments:

Task 1: Experimental Investigation of Monopropellant Ignition and Combustion Processes.

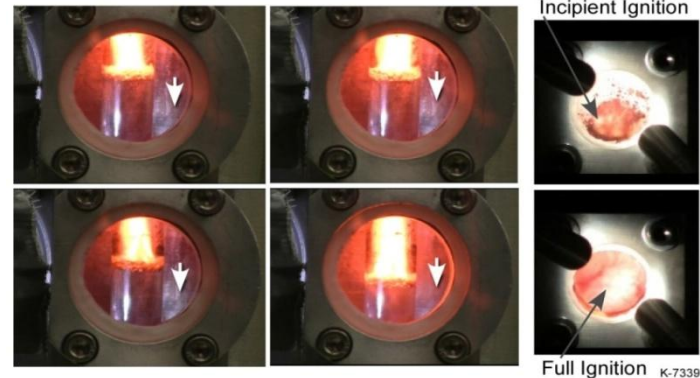
Demonstrated feasibility of ignition & stable combustion

Task 2: Monoprop Space Thruster Design Concepts and Analysis

Developed ignition/combustor configuration concepts

Task 3: Management and Reporting

Demonstrated Liquid Monoprop Ignition & Sustained Strand Burn



NASA and Non-NASA Applications

NASA: Propulsion systems for future science missions requiring high performance in challenging environmental conditions, long operational life, and high duty cycles. Examples of missions enabled include: Sampling atmospheres of planets, their moons, and other small bodies, descent and landing on their surfaces, returning soil samples from their surfaces in ascent modules, and rendezvous and docking with orbiting mother ships.

Non-NASA: Liquid thrusters for in-space propulsion (Air Force); On-demand, rapid response, liquid monopropellant gas generators (Army), and Maneuverable, throttleable tactical missiles (Air Force)

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NON-PROPRIETARY DATA